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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|-----------------------|------------------|
| 10/662,992 | 09/15/2003 | F. Conrad Greer | 50715/P004US/10311738 | 2249 |
| 29053 7590 03/14/2008 FULBRIGHT & JAWORSKI L.L.P. 2200 ROSS AVENUE SUITE 2800 DALLAS, TX 75201-2784 | | | | |
| EXAMINER | | | | |
| NGUYEN, NGOC YEN M | | | | |
| ART UNIT | | PAPER NUMBER | | |
| 1793 | | | | |
| MAIL DATE | | DELIVERY MODE | | |
| 03/14/2008 | | PAPER | | |

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/662,992
Filing Date: September 15, 2003
Appellant(s): GREER ET AL.

Craig Cox
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed December 10, 2007 appealing from the
Office action mailed July 13, 200.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellants' statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellants' statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

| | | |
|------------------|------------------------|----------------|
| 4,034,070 | Wojtowicz et al | 07-1977 |
| 4,938,945 | Mahmood et al | 07-1990 |
| 5,286,882 | Zuzich et al | 02-1994 |

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

An election of species had been made in this instant application for the "metal fluoride" (note Office action mailed October 11, 2006) and Appellants had elected iron fluoride species (note Response filed November 13, 2006). All claims are examined only to the extent of the elected species.

Claims 1-24, 26, 28-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Appellants regards as the invention.

Where Appellants act their own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the Appellants intended to so redefine that claim term. *Process*

Control Corp. v. HydReclaim Corp., 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The term "metal" in claim 1 is used by the claim to include "metal compound" (note claim 3), while the accepted meaning is *pure* "metal" or possibly a metal alloy. The term is indefinite because the specification does not clearly redefine the term.

In claims 28-30, it is unclear what is required by "a predetermined reaction temperature". Does the "reaction temperature" refer to the temperature in the "introducing" step, "agitating" step, "venting" step or "maintaining" step?

Claims 1-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wojtowicz et al (4,034,070) in view of Mahmood et al (4,938,945), optionally in view of Zuzich et al (5,286,882).

Wojtowicz et al. '070 disclose a process for preparing anhydrous metal fluoride which comprises reacting, in the presence of a nitrile having 2-4 carbon atoms, a metal with HF and halogen, both in substantially anhydrous form, said halogen being selected from the group consisting of chlorine, bromine, iodide and a mixture thereof, the reaction being carried out using, per every gram-equivalent of metal, about 0.1-50 gram-moles (i.e. moles) of HF and about 0.025-25 gram-moles of halogen (note claim 1). Thus, for every gram of metal, $(0.1-50) \times (\text{MW of HF} = 20)$ or 2-1000 g of HF are used. This range overlaps the claimed range. With respect to the encompassing and overlapping ranges previously discussed, the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time of invention to select the

portion of the prior art's range which is within the range of the Appellants' claim because it has been held prima facie case of obviousness to select a value in a known range by optimization for the results. *In re Boesch*, 205 USPQ 215. Additionally, the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a prima facie case of obviousness. *In re Malagari*, 182 USPQ 549.

The presence of any extra reactants, such as the nitrile, is not excluded by the "comprising" language of the instant claims.

The metal reactant can be any one which will react with HF and halogen to form metal fluoride, for example iron among others (note column 1, lines 32-41). The reaction produces HCl as a by-product (note column 2, lines 53-54).

Any convenient order of mixing the reactants and the nitrile may be employed. The HF and the nitrile may initially be mixed together, then the metal may be added followed by the bubbling in the halogen, or the halogen may be added to the HF-nitrile mixture followed by the final addition of the metal (note column 2, lines 25-32). This fairly teaches that the metal is added to the HF as required in the instant claims, (note that the metal is added in the "final addition").

Wojtowicz et al. '070 further disclose that the reaction can be effected at any suitable temperature, not that there is no criticality with respect to the temperature necessary to bring out reaction (note column 2, lines 32-46). Neither is there any criticality in the pressure used to effect the reaction. When elevated pressure is

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employed, means should be provided to vent off by-product HCl (note column 2, lines 47-54). Thus, it would have been obvious to one of ordinary skill in the art to optimize the temperature and/or pressure in the process of Wojtowicz et al. '070 in order to obtain the desired metal fluoride product.

The resulting product mixture, containing the metal fluoride, is usually a stable mixture. It, therefore, can be stored as such, if desired, until such time as the recovery or separation of the metal fluoride is desired (note column 2, lines 60-66). Separation and recovery of the metal fluoride from the reaction product mixture can be achieved using any satisfactory, convention technique. The ultimate product purity to be attained is usually a matter of choice depending on the intended field of utility (note paragraph bridging columns 2-3). It would have been obvious to one skilled in the art to carry out any additional, conventional steps in order to obtain metal fluoride product with the desired purity.

For the apparatus limitations in the dependent claims, it is well settled that patentability of method claims cannot be predicated on apparatus limitations, In re Tarczy-Hornoch, 158 USPQ 141, 150 (CCPA 1968).

The differences are Wojtowicz et al. '070 do not specifically disclose the step of preheating the anhydrous metal or the step of adding the anhydrous metal in intervals.

Mahmood et al. '945 are applied to show that the process of Wojtowicz et al. '070 is an endothermic reaction.

Mahmood et al. '945 disclose a process for producing anhydrous ferric fluoride according the endothermic reaction between ferric chloride and HF (note claim 1).

Mahmood et al. '945 further disclose that the reaction of FeCl_3 and HF is endothermic because of the generation of HCl gaseous by-product.

In the process of Wojtowicz et al. '070, because the iron metal and the chlorine reactants may have reacted to form iron chloride first (just like iron chloride is used in Mahmood et al. '945) before reacting with HF to form the metal fluoride and because HCl by-product is formed, it would have been obvious to one skilled in the art to expect that the process of Wojtowicz et al. '070 are an endothermic reaction.

Mahmood et al. '945 are also applied to teach the importance of controlling the temperature in the endothermic reaction to form the metal fluoride.

Since the process of forming the metal fluoride is endothermic, the reaction temperature may be subjected to cooling below critical, which results in slow-down or even cessation of the reaction (note column 4, lines 20-26). Mahmood et al. '945 also teach that heat can be supplied to the reaction (note column 3, lines 23-26). It is also known in the art that the higher the temperature, the faster the reaction rate.

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to supply heat to the reaction of Wojtowicz et al. '070, as suggested by Mahmood et al. '945 in order to accelerate the reaction rate and to prevent slow-down of the reaction due to the endothermic reaction (caused by energy loss of the HCl gas generation). Without a showing of criticality or unexpected results, it is well within the skill of the artisan to supply the heat by any convention means to the reaction, i.e. preheating either of the reactants or both, preheating the reaction vessel, or heating the combined reactants, as long as the optimum reaction temperature can be attained.

For the limitation of adding the metal at intervals, in the process of Mahmood et al. '945, liquid anhydrous HF was added to FeCl_3 and reaction mass temperature was maintained by controlling the rate of introduction of liquid HF (note column 4, lines 26-40). Even though the order of adding the reactants in Mahmood et al. '945 are different than that of Wojtowicz et al. '070, however, Mahmood '945 still fairly suggest to one of ordinary skill in the art that the reaction temperature for the endothermic reaction for producing metal fluorides can be maintained within the desired range by controlling the rate of introduction of the reactant being added (which is HF in the process of Mahmood et al. '945). In the case of Wojtowicz et al. '070, since the metal is being added last, it would have been obvious to one of ordinary skill in the art to optimize the rate of adding the metal to the other reactants, as suggested by Mahmood et al. '945, in order to maintain the reaction temperature within the desired range, i.e. to prevent the reaction temperature from cooling below critical which results in slow-down or even cessation of the reaction.

Optionally, Zuzich et al. '882 can be applied to teach that the reaction temperature in an exothermic reaction can be controlled by slowly adding the reactant (note column 13, lines 1-5). Such teaching would be equally applied for an endothermic reaction because by slowly adding the reactant, the drop in the temperature due to the endothermic reaction would be more gradual and it would be easier to compensate to the temperature loss.

Mahmood et al. '945 are further applied to teach the "mixing action". Mahmood et al. '945 disclose that means for agitating the reaction mass may be provided to

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ensure physical contact between the reactants (note column 3, lines 29-34 and column 4, lines 65-68).

Mahmood et al. '945 can be applied to teach that ferric chloride can be used instead of the iron and chlorine as disclosed in Wojtowicz et al. '070 for the process of producing metal fluorides.

(10) Response to Argument

A. Rejections under 35 U.S.C. §112

Appellants urge that it is common in the context of describing reactions, for one skilled in the art to refer to "metal" to represent elemental metal or metal compound supplying the elemental metal to the reaction and if each claim is read in light of the specification and the claims as a whole, one skilled in the art would know that "metal" in the context of the current disclosure means elemental metal or a compound that supplies the elemental metal to the reaction.

It is noted that both the prior art mentioned in the instant specification and the description of the claimed invention recognize that metal and metal compounds are distinct in the process of making metal fluoride (note paragraphs [0004] and [0005] that separately recite "metal" and "nonfluorinated metal compound"; note "metal and/or metal compound" in paragraphs [0008], [0036], [0037]; note also paragraphs [0026], [0029] that recite "metal and/or nonfluorinated metal compounds"). This clearly indicates that metal and metal compounds are different. There is no disclosure in

Appellants' application to indicate that "metal" refers to a metal-containing compound. The term "metal" would not encompass "metal compound" as now contemplated in the instant claims.

Appellants argue that in Appellants' specification, it is disclosed that the metal reactants may be elemental metal or a metal compound.

Even if the above statement was true, Appellants' claim 1, however, only recites "anhydrous metal" not "anhydrous metal *reactant*". Thus, while "metal reactants" may be elemental metal or metal compound, but "metal" can only be metal, not metal compound.

The 35 U.S.C. § 112 rejections to claims 28-30 are maintained because these claims are still pending even though Appellants have expressed a willingness to cancel these claims upon allowance of the other claims.

B. Rejections under 35 U.S.C. § 103(a)

* Claim 1.

Appellants argue that in Mahmood et al., hydrofluoric acid is added to the metal compound, not "introduce aliquots of the anhydrous metal into the anhydrous hydrofluoric acid" as required in Appellants' claim 1.

It should be noted that Mahmood et al. are not relied upon to teach the "order" of adding the reactants. Mahmood et al. are relied upon to teach or suggest to one skilled in the art, among other features, that the reaction of forming metal fluoride and HCl by-product, as disclosed in Wojtowicz et al., is an endothermic reaction and the need to

maintain the reaction temperature by supplying heat and/or controlling the rate of introduction of a reactant (note the above rejection and Mahmood et al. '945, column 4, lines 20-40). For the order of adding the reactants, Wojtowicz et al. '070 fairly teach that metal can be the "final" addition in the process of producing metal fluoride, i.e. metal is added to the mixture of HF and nitrile. Thus, the order of adding the reactants in Wojtowicz et al. '070 is the same as that required in Appellants' claim 1.

Appellants argue that there is no fact-specific analysis of the claims showing that Mahmood et al. '945 disclose or suggest introducing aliquots of the anhydrous metal into the anhydrous hydrofluoric acid in the reaction vessel at intervals.

As stated in the above rejection, even though the order of adding the reactants in Mahmood et al. '945 is different than the order disclosed in Wojtowicz et al. '070, however, Mahmood et al. '945 still fairly teach the need to maintain the reaction temperature in order to prevent the slow-down or even cessation of the endothermic reaction for producing metal fluoride. Mahmood et al. '945 also fairly suggest to one skilled in the art that the rate of introduction of the reactant being added (HF in Mahmood et al. '945, metal in Wojtowicz et al. '070) to the other reactant(s) (ferric chloride in Mahmood et al. '945, HF and nitrile in Wojtowicz et al. '070) can be controlled to maintain the endothermic reaction temperature. As suggested in Mahmood et al. '945, the reactant being added is not added all at one time; thus, this reactant is considered as being added as "aliquots". For the "intervals" limitation, Appellants' specification does not provide a clear definition as to what being required by "intervals". The "intervals" can be considered as the space of time between the start of

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the "introduce" step and the end when the entire predetermined weight of the reactant has been added. If "intervals" require a certain "pause" time period during the step of adding the reactant, the "pause" time can be short enough that there would be no patentable difference between the claimed "intervals" and a step of slowly and continuously adding the same reactant as long the reaction temperature can be maintained within the desired range. In any event, since Mahmood et al. '945 suggest the step of controlling the "rate" of addition of the reactant in order to maintain the reaction temperature, it would have been well within the skill of the artisan to optimize the "rate", with or without pause time, so that there would be sufficient amount of time for measuring the reaction temperature and for making any necessary adjustment to the rate of adding the reactant to maintain the reaction temperature within a desired range.

Appellants argue that the use of Zuzich et al. in a combination to render claim 1 obvious is using hindsight reconstruction because Appellants' claim 1 requires an endothermic reaction while Zuzich et al. discloses an exothermic reaction.

Granted that Zuzich et al. do not disclose an endothermic reaction; however, in both endothermic reaction (as disclosed in Wojtowicz et al. '070 and Mahmood et al. '495) and exothermic reaction (as disclosed in Zuzich), controlling the reaction temperature is a concern; thus, Zuzich et al. '882 and Wojtowicz et al. '070/Mahmood et al. '495 are considered as analogous art with respect to the problem of controlling the reaction temperature. "Under the correct analysis, any need or problem known in the field of endeavor at the time of the invention and addressed by the patent [or application at issue] can provide a reason for combining the elements in the manner claimed." KSR

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International Co. v. Teleflex Inc., 550 U.S. ___, ___, 82 USPQ2d 1385, 1397 (2007).

Thus, a reference in a field different from that of Appellants' endeavor may be reasonably pertinent if it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his or her invention as a whole (note MPEP 2141.01(a)). As taught in Zuzich et al., to control the reaction temperature, the rate of adding the reactants needs to be control, i.e. the slower the rate of adding the reactants, the smaller the change in the reaction temperature, in Zuzich et al. case, the slower the increase in the reaction temperature. It would have been obvious to one skilled in the art to expect the same result when the teaching of Zuzich e al. is applied for an endothermic reaction, i.e. the slower the rate of adding the reactants, the slower the decrease in the reaction temperature.

* Claim 31

The differences between claim 31 and claim 1 are: the metal and hydrofluoric acid are not required to be "anhydrous"; there is no preheating step.

Appellants present the same arguments for claim 31 as for claim 1. Therefore, the rejection of claim 31 is maintained for the same reasons as stated above.

* Claim 34.

Appellants urge that claim 34 requires "introducing ferric chloride into the hydrofluoric acid in the reaction vessel at intervals...."

As stated in the above rejection, Mahmood et al. '945 is applied to teach that ferric chloride (FeCl_3) can be used instead of the iron metal and chlorine as used in Wojtowicz et al. '070 to produce metal fluoride and HCl.

The rejection of claim 34 is further maintained for the same reasons as stated above.

* Dependent claims 2-30, 32-33.

Appellants argue that the applied art does not teach all the limitations of claims 1 or 31 and for this reasons claims 2-30, 32-33 are patentable.

Since the rejection of claims 1 and 31 is maintained, the rejection of claims 2-30, 32-33 is also maintained for the same reasons as stated above.

Appellants argue that the limitations in the dependent claims are not shown as being obvious in view of the applied art.

The limitations in the dependent claims are addressed in the above rejection. Appellants have not provided any additional reasons as to why these dependent claims would be patentable over the applied prior art.

Appellants argue that, "[T]he mere inclusion of structure in a method claim does not itself render the claim unstatutory or fatally defective".

It should be noted that none of the dependent claims was rejected as being "unstatutory or fatally defective". In the above rejection, the apparatus limitations were found to have not rendered the claimed process novel or unobvious because these

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apparatus limitations are drawn to known and conventional means in the art to carry out the intended purpose.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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